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10/575,463	04/12/2006	Takashi Izumi	L9289.06139	3207

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EXAMINER	
PATEL, MUNJALKUMAR C	
ART UNIT	PAPER NUMBER
4113	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/575,463	IZUMI ET AL.	
	Examiner	Art Unit	
	Munjal Patel	4113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/05/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. In the amendment applicant suggested that the new drawing sheets were included but examiner did not find it as part of the application. In absence of replacement drawings examiner is considering the old drawings as a reference here.

2. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because it does not include the following reference sign(s) mentioned in the description: Local Oscillator block and signal labels. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either " Replacement Sheet" or " New Sheet" pursuant to 37 CFR 1.121(d). If any changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. Applicant is advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

3. Figures 3,4,6,7,8,9,10,11,12 and 16 have multiple blocks labeled " Local Oscillator" where the blocks are not differentiated on the drawings, some of their outputs signals are not labeled, Especially for block 116. Figures 3,4,6,7,8,9,10,11,12,14 and 16 have multiple signals coming out of mixers tied together on the drawings with non

functional dots. This is physically not realizable without specifying the nature of the connections. It is not clear if this is an electrical summation function or implied addition through direct electrical connection. Applicant is advised to clarify in drawings.

4. Reference in the specifications is made to signals that are not identified on the drawings: “First local signal”, “First constant-envelope signal”, “second local signal”, “second constant envelope signal” and “local signals”.

5. Appropriate correction is required.

Specification

6. Reference in the specifications is made to signals that are not identified on the drawings: “First local signal”, “First constant-envelope signal”, “second local signal”, “second constant envelope signal” and “local signals”.

7. The disclosure is objected to because of the following informalities: Fig 3 Blocks 18a+b are not described in the specification.

8. Applicant suggested amendment to paragraph 0008, 0043 & 0143 but examiner found out those were 0006, 0020 & 0110 respectively.

9. Appropriate correction is required.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1,2, 8 & 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admission of prior art (AAPA) herein after referred as AAPA as applied to claim above, and further in view of Okubo (US 5,264,807) herein after referred as Okubo.

12. Regarding claim 1, AAPA discloses An amplifier circuit (Fig 3 [10a]) comprising; a constant-envelope signal generating section (AAPA: Fig 3: 11) that generates first and second constant- envelope signals (AAPA: Embedded in output of Fig 3:11) ; a local oscillating section (AAPA: Fig 3:20) that generates a first and second local signal (AAPA: Fig 3: outputs of 20) a frequency conversion section (AAPA: Fig 3:21a+b) that performs frequency-conversion of the first and second constant-envelope (AAPA: fig 3: output of 19a+b, 19c+d)) using the first and second local signals respectively signal (AAPA: Fig 3:output of 19a+b, 19c+d); an amplifying section (AAPA: Fig 3:12 &Fig 3:13) that amplifies the first constant (AAPA: Fig 3:output of 21a) and second constant-envelope signals after the frequency-conversion signal (AAPA: Fig 3:output of 21b); and a combining section (FIG 3: 14)that combines the first constant and second constant-envelope signals after the amplification (AAPA: Fig 3), signal the amplifier circuit (AAPA: Fig 3:12 & 13)further comprising: a local signal phase-shifting section that rotates phases of the first and second local signals before the frequency-conversion(AAPA: Fig 3: 21a & 21b), so that the first and second local signals after the rotation have a 180° phase difference; and a constant-envelope signal phase-shifting section (AAPA: Fig 3:18a & Fig 3: 18b) that rotates a phase of the first constant- envelope signal before the frequency-conversion, by the same amount as the rotation of the first

local signal and in an opposite direction to the rotation of the first local signal (AAPA: Fig 3:18a & Fig 3: 18b), and rotates a phase of the second constant-envelope signal before the frequency conversion(AAPA: Fig 3:18a & Fig 3: 18b), by the same amount (Okubo: Abstract, lines 13-16) as the rotation of the second local signal and in an opposite direction to the rotation of the second local signal (AAPA: Fig 3:18a & Fig 3: 18b).

13. However AAPA fails to disclose having the first and second local signals after the rotation have a 180° phase difference (Okubo: column 4,lines 33-39); and a constant-envelope signal phase-shifting section (AAPA: Fig 3:18a & Fig 3: 18b) that rotates a phase of the first constant- envelope signal before the frequency-conversion, by the same amount (Okubo: Abstract, lines 13-16) as the rotation of the first local signal and in an opposite direction to the rotation of the first local signal (AAPA: Fig 3:18a & Fig 3: 18b), and rotates a phase of the second constant-envelope signal before the frequency conversion(AAPA: Fig 3:18a & Fig 3: 18b), by the same amount as the rotation of the second local signal (Okubo : column 4 lines[26-33]) and in an opposite direction to the rotation of the second local signal (AAPA: Fig 3:18a & Fig 3: 18b),

14. However Examiner maintains that it was well known in the art to the first and second local signals after the rotation have a 180° phase difference (Okubo: column 4[lines 33-39); and a constant-envelope signal phase-shifting section (AAPA: Fig 3:18a & Fig 3: 18b) that rotates a phase of the first constant- envelope signal before the frequency-conversion, by the same amount (Okubo: Abstract, lines 13-16) as the rotation of the first local signal and in an opposite direction to the rotation of the first local signal (AAPA: Fig 3:18a & Fig 3: 18b), and rotates a phase of the second

constant-envelope signal before the frequency conversion(AAPA: Fig 3:18a & Fig 3: 18b), by the same amount as the rotation of the second local signal (Okubo : column 4 lines[26-33]) and in an opposite direction to the rotation of the second local signal (AAPA: Fig 3:18a & Fig 3: 18b) as taught by Okubo.

15. In a similar field of endeavor Okubo discloses having respective predetermine phases and having 180 phase difference between first local signal and second local signal. In addition Okubo discloses High frequency power amplifier with high efficiency and low distortion circuit which uses single stage 180 phase shifter(Okubo: Column 4, lines[26-39]).

16. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify AAPA by specifically providing 180 phase shifter (Okubo: Column 4, lines[26-39] & Abstract lines [13-20] to have 180 phase difference between fist local signal and second local signal, for the purpose of providing a phase shift, which can be treated mathematically, and lumped in one location in a circuit or distributed in multiple locations) to achieve the same result.

17. Regarding claim 2, AAPA in view of Okubo discloses everything of claim 1 as above, further comprising a local signal phase adjustment section that adjusts a phase of at least one of the generated first local signal and second local signal. AAPA phase shift blocks (AAPA: Fig 3: 18a+b) adjust the phase of the first local oscillator signal.

18. Claim 3, 6 are rejected under 35 U.S.C 103(a) as being unpatentable over AAPA in view of Okubo as applied to claim 2 above, and further in view of Moriyama(US 5,903,823) herein after referenced as Moriyama.

19. Regarding claim 3, AAPA in view of Okubo discloses everything in claim 2 as above, however fails to disclose a detecting section that detects a leakage of local signals in an output signal. However, the examiner maintains that it was well known in the art to have detecting section that detects a leakage of local signals in an output signal obtained as a result of combining by the combining section; and a phase control section that controls the local signal phase adjustment section in such a manner that the detected level is minimized.

20. In a similar field of endeavor Moriyama discloses a detecting section that detects a leakage of local signals in an output signal (Moriyama: Column 9, line 18 - column 10 line 12) obtained as a result of combining by the combining section (AAPA: Fig 3:14); and a phase control section (Moriyama: column 10 line [58 -68]).that controls the local signal phase adjustment section in such a manner that the detected level is minimized.

21. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to modify AAPA in view of Okubo by specifically providing a detecting section(Moriyama: Column 9, lines 18 - column 10, line -12) that detects a leakage of local signals in an output signal as taught by Moriyama, for the purpose of Leakage of carrier produced due offset of the orthogonal modulator is detected and the arithmetic/control unit adjusts the level of the modulating signals or shifts the phase of

the reference carrier wave in such a manner that the leakage of carrier(offset) becomes zero.

22. Regarding claim 6, AAPA in view of Okubo discloses everything in claim 1 as above. However AAPA in view of Okubo fails to disclose a constant envelope signal phase adjustment section that adjust a phase of at least one of the frequency-modulated first constant-envelope signal and second constant-envelope signal.

23. However, Examiner maintains that it was well known in the art to have a constant envelope signal phase adjustment section that adjust a phase of at least one of the frequency-modulated first constant-envelope signal and second constant-envelope signal.

24. In a similar field of endeavor Moriyama discloses equivalent of a constant-envelope signal phase adjustment section that adjusts a phase of at least one of the frequency-modulated first constant-envelope signal and second constant-envelope signal. As Moriyama (Column 13, lines 52-60)" In fig 7B, the phase-difference measurement unit 24e of the phase-difference correcting Arithmetic/control section 102 measures the phase difference d.theta between the modulating signals and demodulated signals before pre-distortion processing is executed, and the phase-shift quantity controller 24i shifts the phase of the reference carrier wave to be added to the orthogonal modulator 28 (Fig 6) or orthogonal detector 34 in such a manner that the phase difference d.theta becomes zero.

25. Therefore, it would been obvious to one of ordinary skill in the art at the time of the invention was made to modify AAPA in view of Okubo by specifically providing a constant envelope signal phase adjustment section that adjust a phase of at least one of the frequency-modulated first constant-envelope signal and second constant-envelope signal as taught by Moriyama for the purpose of compensate for offsets in transmitter signal phase as specified in the invention of Moriyama ' This invention relates to a radio apparatus equipped with a distortion compensation function in which the amplification characteristic of a transmission power amplifier is linearized to suppress non-linear distortion and reduce power leakage between adjacent channels.

26. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admission of prior art (AAPA) herein after referred as AAPA in view of Okubo further in view of Mini-Circuits NPL.

27. Regarding claim 4, AAPA in view of Okubo discloses everything in claim 1 as above, however fails to disclose local signal amplitude adjustment section that adjusts an amplitude of at least one of the generated first local signal and second local signal. However, the examiner maintains that it was well known in the art to have a local signal amplitude adjustment section that adjusts amplitude of at least one of the generated first local signal and second local signal.

28. In similar field of endeavor Mini-circuits NPL discloses the use of mixers in RF frequency conversion and discusses the design trade offs between signal level and local oscillator(LO) signal level and resultant carrier leakage(pp. 1-10). In the

application the equivalent of local signal amplitude adjustment section is to put an attenuator between the output of the local oscillators (Fig 3:20, 22) and the input to the mixer stages (Fig 3:19a, b, c and d and 21a and b).

29. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify AAPA in view Okubo by specifically providing the use of mixers in RF frequency conversion and discusses the design trade offs between signal level and local oscillator(LO) signal level and resultant carrier leakage(pp. 1-10). In the application the equivalent of local signal amplitude adjustment section is to put an attenuator between the output of the local oscillators (Fig 3:20, 22) and the input to the mixer stages (Fig 3:19a, b, c and d and 21a and b), as taught by Mini-circuits NPL. For the purpose of having attenuators to adjust signal levels in RF circuitry. The Mini-Circuits mixer1-5.pdf application note gives the rational for controlling the local oscillator(LO) signal amplitude as Decide what frequency range is involved. The LO drive available, the level of harmonic and two-tone, third-order inter-modulation (IM) distortion you can tolerate.

30. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the AAPA in view of Okubo & Mini-Circuits NPL in further in view of Daniel(US PAT: US 4,243,955) herein after referenced as Daniel.

31. Regarding claim 5, AAPA in view of Okubo and Mini-Circuits NPL discloses everything in claim 4 as above, however AAPA in view of Okubo and Mini-circuits NPL

fails to disclose a detecting section that detects a level of leakage of the local signals in an output signal in such a manner that the detected level is minimized.

32. However, Examiner maintains that it was well known in the art to have a detecting section that detects a level of leakage of the local signals in an output signals in such a manner that the detected level is minimized.

33. In similar field of endeavor Daniel discloses equivalent to “a detecting section that detects a level of leakage of the local signals in an output signal in such a manner that the detected level is minimized” .(Daniel: Column 4, lines 21-29) “In this configuration, the in-phase and quadrature correlations of the output signal of modulator 30 are derived and are used as control signals to weight the in-phase and quadrature LO outputs before pre-combining in the first summing device 58 which, upon weighting with amplifier 60, is combined with the output signal of modular 30 via the second summing device 56, thereby producing a final mixed signal with a substantially reduced carrier leakage term.”

34. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to modify AAPA in view of Okubo & Mini-Circuits NPL in further view of Daniel's feedback method to control LO feed through for the purpose of improving performance of the systems using suppressed carrier modulation as its often limited by how well carrier suppression is maintained.

35. Regarding claim 7, AAPA in view of Okubo discloses everything in claim 1 as above along with a wireless base station apparatus comprising the amplifier circuit (AAPA: paragraph 2, lines [13-16])according to claim 1.

36. Regarding claim 8, AAPA in view of Okubo discloses everything in claim 1 as above along with a wireless terminal apparatus comprising the amplifier circuit (AAPA: paragraph 2, lines [13-16]) according to claim 1.

37. Regarding claim 9, AAPA discloses an amplifier circuit (Fig 3:10a) comprising: a constant-envelope signal generating section that generates first (AAPA: Fig 3:outputs of 19a+b)and second (AAPA: Fig 3: outputs of 19c+d)constant-envelope signals; a local oscillating section (Fig 3: outputs of 16a+b) that generates first and second local signals(Fig 3: outputs of 16c+d); a frequency conversion section that performs frequency-conversion of the first (AAPA: Fig3:21a)and second(AAPA: Fig 3:21b) constant-envelope signals using the first (AAPA: Fig 3:output of 20)and second (AAPA: Fig 3:output of 20)local signals respectively; an amplifying section (AAPA: Fig 3:12, 13) that amplifies the first and second constant-envelope signals after the frequency-conversion; and a combining section (AAPA: Fig 3: 14) that combines the first and second constant-envelope signals after the amplification, the amplifier circuit further comprising: a local signal phase-shifting section (AAPA: Fig 3: 18a+b) that rotates a phase of the first local signal without rotating a phase of the second local signal before the frequency-conversion, so that the first and second local signals after the rotation

have a 180° phase difference; and a constant-envelope phase-shifting section(AAPA: Fig3:18a+b) that rotates a phase of the first constant-envelope signal without rotating a phase of the second constant-envelope signal before the frequency- conversion, by the same amount as the rotation of the first local signal and in an opposite direction to the rotation of the first local signal.

38. However, AAPA fails to disclose that local phase shifting section that rotates a phase of the first local signal without rotating a phase of the second local signal(Okubo: lines 61-70) before the frequency conversation, so that the first and second local signals after the rotation have a 180 degree phase difference; and constant envelope phase shifting section that rotates a phase of the first constant-envelope signal without rotating a phase of the second constant-envelope signal before the frequency conversion by the same amount as the rotation of the first local signal and in opposite direction to the rotation of the first local signal.

39. In a similar field of endeavor Okubo discloses a High frequency power amplifier with high efficiency and low distortion. In addition Okubo discloses a phase shift block to achieve the 180 degree phase shift (Okubo: Abstract lines [13-19]).

40. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify AAPA by specifically providing single phase shift block to achieve the 180 degree phase shift as taught by Okubo for the purpose of shifting the phase of first local signal and second local signal.

Response to Arguments

41. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

42. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, rationale for motivation is that the phase shift can be treated mathematically, and lumped in one location in a circuit or distributed in multiple locations to achieve the same result, furthermore Okubo discloses in abstract that using a phase shift circuit in high frequency amplifier can improve the efficiency of the amplifier by controlling the input impedance of the power synthesizing circuit.

Conclusion

43. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. US 20080039024A1: Amplifying circuit, Radio Communication Circuit, Radio Base Station device and Radio terminal device.

b. US 4591803 A : Linear FET power amplifier.

c. US 4591800 A : Linear power amplifier feedback improvement.

d. US 5481218 A : Logarithmic converter.

e. US 5892397 A : Adaptive compensation of RF amplifier distortion.

44. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Munjal Patel whose telephone number is (571)270-5541. The examiner can normally be reached on Monday - Thursday 8:00 AM - 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jefferey Harold can be reached on 571-272-7519. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Munjal Patel
Examiner
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mp
/Jefferey F Harold/
Supervisory Patent Examiner, Art Unit 4113